

INTERMEDIATE CERTIFICATE EXAMINATION, 1967

MATHEMATICS (Algebra)

MONDAY, 12th JUNE - Afternoon, 2.30 to 5

ALL questions to be answered

Mathematical Tables may be obtained from the Superintendent

1. (a) Find the values of x which satisfy the following:
- (i) $3 - x = 4$,
- (ii) $\frac{2}{x} = 4$,
- (iii) $3 - 2x = 2 - 3x$.
- (b) A boy has x pence and his sister has y pence. Express the following statement in algebraic form:
When his sister is given an extra penny, the boy has then twice as much as his sister.
Write down a similar statement which would be expressed algebraically in the form $3y = x + 2$. (28 marks)
2. (a) Factorise:
- (i) $3x^2 - 8x - 3$,
- (ii) $a^2 - b^2 + 2a - 2b$.
- (b) Show that 3 is the remainder when $x^3 + 2x^2 - x + 1$ is divided by $x - 1$. Hence, or otherwise, find all the factors of $x^3 + 2x^2 - x - 2$. (28 marks)
3. (a) Find, correct to one place of decimals the values of x which satisfy each of the following equations:
- (i) $x^2 + x - 3 = 0$,
- (ii) $(x + 1)^2 + (x + 1) - 3 = 0$.
- (b) If $t^2 = 1 + t$, show that $t^3 = 1 + 2t$. (28 marks)
4. Draw the graph of $x^3 - 5x - 2 (= y)$ for values of x from $x = -3$ to $x = 3$. Find from your graph, as accurately as you can,
- (i) the value of y when $x = 0.5$ and the other values of x for which y has this same value,
- (ii) the square root of 5. (28 marks)
5. Two cars A and B are given equal amounts of the same petrol. For each gallon of petrol car B travels 4 miles further than car A. When both cars have travelled 224 miles, car B has 1 gallon of petrol more than car A. Find the number of miles that each car travels per gallon of petrol. (28 marks)
6. (a) If m and n are positive whole numbers and m is greater than n , prove that $\frac{a^m}{a^n} = a^{m-n}$, where a is not zero.
- (b) Write down the values of $5^6 \div 5^2$, $\left(\frac{1}{4}\right)^{\frac{1}{2}}$, $\log_2 4$, $\log_4 2$.
- Given that $\log_4 x = 0.12$, find the value of $\log_8 x$.
- (c) If $ab = x^2$, show that $\log_a x + \log_b x = 2 \log_a x \log_b x$. (30 marks)
7. (a) Find the values of a , b , c for which $a(x + 1)(x + 2) + b(x + 1) + c = x^2 - 1$ for all values of x .
- (b) If $y = \frac{\sqrt{5} - 1}{\sqrt{5} - 2}$, show that $\frac{y}{y - 1} = \sqrt{5} - 1$. (30 marks)